



Psychosocial Predictors of Return to Duty Among Marine Recruits with Musculoskeletal Injuries

*S. Booth-Kewley
G. E. Larson
R. M. Highfill-McRoy*



Naval Health Research Center

Report No. 08-01

. Approved for Public Release; Distribution Unlimited.

*Naval Health Research Center
140 Sylvester Road
San Diego, California 92106*

Psychosocial Predictors of Return to Duty Among Marine Recruits With Musculoskeletal Injuries

Stephanie Booth-Kewley, PhD*; Gerald E. Larson, PhD*; Robyn M. Highfill-McRoy, MA*†

ABSTRACT Psychosocial factors may have an important impact on injury recovery and return to work. To explore the influence of psychosocial factors in a cohort of injured military personnel, data were collected from 166 Marine Corps basic training recruits with musculoskeletal injuries. This sample was followed prospectively to determine whether they graduated from basic training or were discharged from the Marines. Demographic, injury-related, and psychosocial factors were analyzed to determine predictors of failure to graduate from basic training. The strongest risk factors for failing to graduate were not expecting to graduate, low or uncertain career intentions, lack of determination, psychological distress, and low organizational commitment. In the final multivariate logistics model, two predictors of failure to graduate emerged: not expecting to graduate and low or uncertain career intentions. The results suggest that interventions to reduce attrition in injured military populations should be designed to counter pessimistic expectations and emphasize career opportunities.

INTRODUCTION

Injuries among military personnel result in large, direct medical costs, and have a substantial impact on troop readiness. For example, Kaufman, Brodine, and Shaffer estimated that 6–12% of male recruits per month are injured during basic training,¹ and research shows that the likelihood of early attrition is significantly higher among injured recruits than non-injured recruits. Moreover, in military populations, injuries result in more medical encounters than any other medical condition, and are the source of more peacetime military disability discharges than any other condition.²

Because injuries negatively affect military readiness and inflate medical costs, the U.S. armed services have made several attempts to improve injury rehabilitation programs. The Navy and Marine Corps have instituted the Sports Medicine and Rehabilitation Therapy (SMART) concept, which uses athletic trainers, physicians, and podiatrists to expedite the rehabilitation of injured personnel. However, the efficacy of SMART clinics is still being evaluated, and other rehabilitation programs have thus far not lived up to expectations. For example, Fort Jackson developed the Physical Training and Rehabilitation Program (PTRP) in 1995 to provide a supervised rehabilitation program for trainees with fractures or other disabling injury. An evaluation of PTRP outcomes

by Hauret et al. showed a remarkably high rate of separation from service (57%) vs. successful return to duty.³ The authors concluded that for rehabilitation programs to be more successful, “Administering a questionnaire to newly assigned trainees to assess intrinsic motivation may assist in developing future interventions to reduce attrition.” (p. 567).

The recommendations of Hauret et al.³ are consistent with civilian research suggesting that psychosocial and motivational elements play an important role in medical outcomes⁴ and return to work.^{5–7} For example, several studies have shown that motivation and expectations predict return to work among employees with low-back injuries.^{6,7} The objective of this research effort was to identify psychosocial factors that are predictive of attrition from basic training in a sample of injured Marine recruits.

Injuries During Marine Corps Basic Training

Marine Corps basic training involves 3 months of rigorous conditioning in which recruits engage in a wide variety of physical activities and challenges (e.g., hiking, running, obstacle courses), which are designed to improve their level of fitness and to generally prepare them for full Marine Corps duty. Because of the strenuousness of Marine Corps basic training and because many incoming recruits have a low fitness level, Marine recruits have relatively high rates of basic training injuries. Recruit injuries cause a large, cumulative number of lost training days and are associated with high attrition risk, both of which are costly for the military.⁸

Marine recruits who are injured during basic training are transferred from their regular platoons to the Medical Rehabilitation Platoon (MRP) for evaluation, treatment, and recovery. Recruits are not transferred to the MRP for minor conditions; those who are transferred to the MRP have an injury severe enough to preclude continued training with their regular platoons. Injuries that often necessitate transfer to the MRP include stress fractures, ankle sprains, knee injuries, and other

*Naval Health Research Center, 140 Sylvester Rd., San Diego, CA 92106-3521.

†Science Applications International Corporation, Inc. 10260 Campus Point Drive, San Diego, CA 92121-1578.

This research was supported by U.S. Army Medical Research and Materiel Command, Fort Detrick, MD, under Work Unit No. 60533. The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the U.S. Government. This research has been conducted in compliance with all applicable federal regulations governing the protection of human subjects in research (NHRC.2005.0013).

This manuscript was received for review in April 2008. The revised manuscript was accepted for publication in September 2008.

musculoskeletal injuries. These are also the most common types of injuries in military basic training overall,⁹ and are common in the general U.S. population for the same age group.¹⁰

Once in the MRP, recruits must “wait” varying amounts of time for their injuries to resolve. For most musculoskeletal injuries, recruits undergo required physical rehabilitative treatment (i.e., exercises, physical therapy), lasting many weeks. Suffering from an injury in basic training presents the Marine recruit with a new set of problems on top of the overall stress of recruit training. Most injured recruits will not return to their original training platoon; this severing of social ties alone may severely dampen morale. In addition, injured recruits face uncertainty regarding when they will return to regular training. Because of these and other factors that trigger feelings of discouragement and frustration, recruits in the MRP are at high risk for attrition.¹¹ Even recruits with no psychological or adjustment problems before their injury may develop these problems once they are injured.^{11–13}

Possible Predictors of Successful Injury Recovery

A new recruit’s ability to adjust and adapt successfully to the Marine Corps is a complex function of several key psychosocial and motivational variables. One factor that probably facilitates successful adaption is “organizational commitment.” In a military context, organizational commitment refers to a realignment of personal beliefs, goals, and values to be consistent with those of the military services. It is likely that individuals who quickly internalize Marine Corps values and who incorporate the concept of being a Marine into their own sense of identity will have fewer problems than those who do not. Recruits who develop a strong sense of themselves as Marines may also have higher levels of motivation and determination, leading to greater success in the face of frustrations and setbacks (e.g., being injured).

In the organizational psychology literature, organizational commitment is widely recognized as an important variable that can affect an individual’s likelihood of remaining with an organization, as well as job performance and other important behaviors.¹⁴ In the military, organizational commitment may be even more important than in civilian life because of the highly demanding nature of military service. There is evidence that in military personnel, organizational commitment is predictive of reenlistment, job satisfaction, and adjustment to the military.¹⁵ Because it seemed likely that it would be of key predictive importance, and because little research on organizational commitment has been conducted with recruits, it was examined in the present effort as a predictor of basic training attrition.

“Motivation for enlistment” is another key construct that may have an important impact on recovery and attrition. Some individuals originally join the military for the challenge and adventure; others join to escape from problems or because they lack alternatives. Recruits’ enlistment motives could have an impact on their desire to stay in the military, their overall motivation, and their likelihood of returning to

duty subsequent to being injured. In recent work with Navy recruits (G. E. Larson, S. Booth-Kewley, and H. F. Coard (unpublished data) found that recruits entering with negative enlistment motivations (e.g., recruits who enlisted because someone else wanted them to or to escape problems in civilian life) reported significantly more psychological distress in basic training and were more likely to attrite. Recruits who enlisted for positive reasons reported less distress and were significantly more likely to complete basic training. Because this relatively unexplored variable appeared promising, it was examined as a predictor of basic training attrition.

There is a substantial body of research linking “negative mood” states and psychological distress with poorer recovery from illness and injury and return to work outcomes.^{6,16} Psychological distress and negative affect have been found to have important implications for recovery and return to work in a variety of populations and settings.^{6,17,18} Moreover, negative affective states have also been linked with greater rates of premature discharge from the military.¹⁹ We examined psychological distress as one possible predictor of basic training attrition.

Another psychological construct that may play a role in injury recovery and basic training completion is “self-efficacy.” Self-efficacy reflects an individual’s belief that he or she can perform novel or difficult tasks and cope with adversity in various domains of functioning.²⁰ It predicts health-related actions and outcomes across many health difficulties.²¹ In addition, several studies have specifically linked self-efficacy with injury recovery and return-to-work outcomes.^{22,23} Self-efficacy was included as a predictor in this study.

A number of civilian studies have found that workers who strongly believe that they will recover from their injuries and return to work are more likely to do so than workers who do not hold this belief.^{24,25} For example, a prospective study of chronic back pain patients found that patients’ expectations regarding recovery and return to work significantly predicted their work status 4 years later.²⁵ Moreover, Vickers and his colleagues found that a brief scale assessing Navy recruits’ “expectations about injury recovery” and completion of basic training had a stronger association with basic training completion than any other variable in the study.¹³ Based on this overall pattern of evidence, expectations about completion of basic training was included as a predictor.

Factors related to the injury itself can clearly be expected to have an impact on recovery and completion of basic training. Therefore, injury-related factors (e.g., stress fracture diagnosis, number of injuries) were included as predictors of attrition. In addition, the day on which the injury occurred (“training day”) was examined as a predictor. This variable was included in the study, based on anecdotal evidence suggesting that recruits injured toward the start of the basic training cycle have a lower level of morale and are less determined to complete basic training than those injured later in the training cycle.

Other psychosocial variables that might be expected to have an impact on attrition were also examined. These included

attitude toward basic training, morale, peer bonding, attitude toward drill instructors, and Marine Corps career intentions.

In summary, the objective of the present effort was to identify and subsequently rank the psychosocial factors that predict attrition from basic training (failure to graduate) among Marine recruits who had experienced musculoskeletal injuries.

METHOD

Participants

The sample consisted of 166 male Marine Corps recruits undergoing basic training at the Marine Corps Recruit Depot (MCRD) San Diego, who had been transferred to the Medical Rehabilitation Platoon (MRP) because of injury. Only Marines who had transferred to the MRP for a musculoskeletal injury were enrolled as participants in this study. Participation in the study was voluntary; the overall response rate was 90%.

Characteristics of the study sample are shown in Table I. Because only male Marine recruits receive basic training in San Diego, no females participated. The race/ethnicity distribution of the sample was 73% Caucasian, 18% Hispanic, and 9% "other." Participant age ranged from 17 to 29 years. Most participants had a high school diploma or higher (92%), and the vast majority (96%) were unmarried.

Procedure

All participants completed a 15–20 minute questionnaire, and a 25–35 minute structured private interview with a

civilian researcher. Because we wanted to link interview and questionnaire responses with outcome data (attrition vs. graduation), participants were asked to provide their social security numbers and names. The interval between a Marine being transferred to MRP and being enrolled in the study ranged from 1 week to 7 weeks.

Data collection took place between November 2005 and May 2006. All of the predictor variables and their source (questionnaire vs. interview) are shown in Appendix I. Detailed information about each variable is shown in Appendix II.

Sample Size Determination

A power analysis was conducted to determine the appropriate sample size for this study. On the basis of the literature on psychosocial factors in relation to injury recovery and military attrition, we hypothesized an effect size (Cohen's *d*) of 0.35 between risk factor scores and the outcome (i.e., attrition vs. graduation). Using two-tailed analyses and the 0.05 α level, it was determined that a sample of 140 subjects would provide a power of 0.80. Because it was expected that there would be some missing data, we decided that a sample size of 165 would be sufficient.

Questionnaire

The questionnaire assessed the demographic variables of age, race, level of education, marital status, and time spent in the Delayed Entry Program (DEP). The medical- or health-related variables assessed by the questionnaire included cigarette use, preservice exercise frequency, and height and weight. The questionnaire also measured a wide variety of psychosocial variables, including psychological distress, organizational commitment, self-efficacy, reasons for enlisting, expectations about returning to training, peer bonding, and Marine Corps career intentions (see Appendix II). The majority of the items on the questionnaire were developed for the purposes of this study. However, the questionnaire included some published or previously used scales. Information about these scales is provided below.

The General Self-Efficacy Scale was used to assess self-efficacy.²⁶ This widely used 10-item measure has adequate psychometric properties.²⁶ Sample items include "I can solve most problems if I make the necessary effort" and "I usually handle whatever comes my way." High scores indicate higher self-efficacy.

The General Health Questionnaire-12²⁷ (GHQ-12) was used to assess psychological distress. The GHQ-12 has good psychometric characteristics and appears to be a valid index of psychological distress. Sample items include "Have you recently been feeling unhappy and depressed?" and "Have you recently lost much sleep over worry?" High scores indicate greater distress.

The organizational commitment items were adapted from the organizational commitment scale developed by Meyer and Allen²⁸ and from other military surveys (e.g., a survey by Gade, Tiggle, and Schumm²⁹). The items about reasons for enlisting,

TABLE I. Participant Characteristics

	Study sample (<i>N</i> = 166)
Gender	
Male	100%
Accession age, years	
≤18	29.5%
19–21	47.6%
≥22	22.9%
Race/ethnicity	
Caucasian	72.9%
Hispanic	18.1%
Other	9.0%
Education	
GED	8.4%
High school diploma	53.6%
Some college/college degree	38.0%
Marital status	
Single/never married	96.4%
Married/divorced/widowed	3.6%
Time in Delayed Entry Program (DEP), months	
0–1	39.2%
2–5	34.9%
>5	25.9%

Note: DEP is a program that most individuals entering the U.S. military spend time in before starting their formal enlistment term. Individuals can remain in DEP for up to 365 days.

career intentions, and peer bonding were adapted from other military surveys. Items assessing expectations about returning to training were based on the work of Vickers et al.¹³ The remaining items on the questionnaire were constructed for this study. All items and scales are shown in Appendix II.

Interview

The interview questions were constructed specifically for this study, on the basis of discussions with Marine Corps leaders and staff, medical officers, and other professionals who have experience with injured Marine recruits, as well as on previous military and civilian research. The interview assessed the following variables: how and when the injury happened, the training day on which the injury occurred, the type of injury the recruit had, whether the recruit had been told he had a stress fracture, the number of injuries the recruit had, self-rated severity of the injury, current pain rating (on the day of the interview), the recruit's level of morale while in the MRP, whether other recruits in MRP had hurt the recruit's motivation, his attitude toward the MRP drill instructors, his self-rated level of determination to complete basic training, whether he had ever wanted to quit basic training while in the MRP, and his expectations regarding whether he would graduate from basic training. Information on stress fractures was verified using medical records at MCRD.

Detailed information about all variables in the study, including the items that were used to form each scale, is provided in Appendix II. Scales were used to assess the following predictors: psychological distress, organizational commitment, self-efficacy, positive expectations about returning to duty, perceived limitations because of injury, peer bonding, attitude toward basic training, and positive Marine Corps career intentions. The other predictor variables were measured using individual questions (see Appendix II).

Outcome Data

Attrition status (graduation vs. discharge) was the key outcome variable. If a recruit graduated, the date of graduation was also recorded. If a recruit was discharged, the date of discharge and the reason for the discharge were recorded. MCRD personnel records were used to obtain the outcome data.

Analysis

Logistic regression was used to determine significant predictors of basic training attrition. For use in the logistic regression, scores on each of the scales used in the study (psychological distress, organizational commitment, self-efficacy, positive expectations about returning to duty, perceived limitations because of injury, peer bonding, attitude toward basic training, and positive Marine Corps career intentions) were dichotomized at the median of the distribution. For example, participants who scored ≥ 32 on self-efficacy (the median) were coded as "high"; those who scored < 32 were coded as "low." For the single-item continuous variables (e.g., current

pain rating), responses were dichotomized either on a rational basis or at the median of the distribution.

Logistic regression analyses were performed in two stages. Univariate logistic regression was first performed for each individual predictor. Next, the predictors that were significant in the univariate analyses ($p < 0.05$) were entered into a multivariate logistic regression model. A stepwise method was used with an inclusion value of $p < 0.05$ and a removal value of $p > 0.10$.

RESULTS

Analysis of the attrition status data (graduation vs. discharge) revealed that 54% ($n = 90$) of the study participants graduated from basic training and 46% ($n = 76$) were discharged.

Logistic regression results evaluating the univariate predictors of basic training attrition are shown in Table II. Age and race were significantly related to attrition. Older recruits (ages ≥ 22 years) were significantly more likely to attrite than younger recruits (odds ratio [OR] = 3.16), and Hispanic recruits were significantly less likely to attrite than Caucasian recruits (OR = 0.38). The training day on which the injury happened also emerged as a significant predictor of attrition (OR = 0.51). Recruits who were injured later in training (> 30 days) were about half as likely to attrite than recruits injured within the first 30 days. Surprisingly, neither having a stress fracture nor having more than one injury was associated with attrition.

The psychosocial variables with the strongest associations with attrition were expecting to graduate from basic training (OR = 0.08), positive Marine Corp career intentions (OR = 0.14), self-rated level of determination to complete basic training (OR = 0.21), psychological distress (OR = 4.18), and organizational commitment (OR = 0.26). Additional variables that were significantly associated with attrition included current pain rating (OR = 3.04), positive expectations about returning to training (OR = 0.36), and peer bonding (OR = 0.36). Overall, 16 of the 22 psychosocial variables had significant univariate associations with basic training attrition.

All of the predictors that were significant at the $p < 0.05$ level in the univariate analysis were entered into a multivariate logistic regression model. Table III presents the results of the final model to predict attrition. Two variables emerged as significantly predictive of attrition in the final multivariate model: expecting to graduate from basic training (OR = 0.16) and having strong Marine Corps career intentions (OR = 0.27). Recruits who believed they would graduate were much less likely to attrite than recruits who did not expect to graduate. Similarly, recruits with strong positive Marine career intentions were much less likely to attrite than those who lacked strong career intentions.

DISCUSSION

To determine the influence of psychosocial factors on return to duty after basic training injuries, data were collected from a sample of injured recruits, who were followed prospectively

TABLE II. Univariate Logistic Regression Results To Predict Attrition

Variable	OR	95% CI
<i>Descriptives</i>		
Accession age, years		
≤18	1.00	
19–21	1.82 ^a	0.86–3.82
≥22	3.16*	1.31–7.65
Race/ethnicity		
Caucasian	1.00	
Hispanic	0.38*	0.16–0.92
Other	1.58 ^a	0.53–4.70
Education		
GED	1.00	
High school diploma only	0.53 ^a	0.17–1.67
Some college/college degree	0.73 ^a	0.23–2.34
Marital Status		
Single/never married	1.00	
Married/divorced/widowed	0.58 ^a	0.10–3.26
Time in Delayed Entry Program (DEP), months		
0–1	1.00	
2–5	1.32 ^a	0.65–2.69
> 5	1.05 ^a	0.48–2.27
Training day injured		
0–30 days	1.00	
>30 days	0.51*	0.27–0.95
<i>Medical or Health-Related Variables</i>		
Diagnosis of a stress fracture		
No	1.00	
Yes	1.28 ^a	0.69–2.36
More than one injury		
No	1.00	
Yes	1.70 ^p	0.87–3.30
Cigarette use		
Nonsmoker	1.00	
Smoker	0.78 ^a	0.42–1.44
Exercise frequency before entering the Marines		
Low	1.00	
High	0.70 ^p	0.35–1.39
Body mass index (BMI)		
Normal or underweight	1.00	
Exceeds normal	1.36 ^a	0.71–2.61
<i>Psychosocial Variables</i>		
Psychological distress		
Low	1.00	
High	4.18**	2.17–8.02
Organizational commitment scale		
Low	1.00	
High	0.26**	0.14–0.50
Self-efficacy		
Low	1.00	
High	0.42*	0.23–0.79
Enlisted for travel and adventure		
No	1.00	
Yes	0.99 ^a	0.53–1.83

Variable	OR	95% CI
<i>Psychosocial Variables (continued)</i>		
Enlisted for educational benefits		
No	1.00	
Yes	0.99 ^a	0.53–1.83
Enlisted because he did not know what else to do		
No	1.00	
Yes	1.90*	1.02–3.56
Enlisted to develop self-discipline		
No	1.00	
Yes	0.44*	0.23–0.86
Enlisted to serve country		
No	1.00	
Yes	0.57 ^a	0.28–1.18
Certainty about decision to join		
No	1.00	
Yes	0.51*	0.27–0.95
Positive expectations about returning to training		
Low	1.00	
High	0.36**	0.19–0.69
Self-rated severity of injury		
Low	1.00	
High	1.10 ^p	0.58–2.08
Current pain rating		
Low	1.00	
High	3.04**	1.61–5.76
Perceived limitations due to injury		
Low	1.00	
High	1.80 ^p	0.97–3.33
Peer bonding		
Low	1.00	
High	0.36**	0.19–0.69
Positive attitude toward basic training		
Low	1.00	
High	0.47*	0.25–0.88
Morale while in MRP		
Low	1.00	
High	0.40**	0.21–0.75
Other recruits in MRP have hurt his motivation		
No	1.00	
Yes	2.03*	1.03–3.97
Positive attitude toward MRP drill instructors		
Low	1.00	
High	0.79 ^a	0.38–1.63
Self-rated level of determination to complete basic training		
Low	1.00	
High	0.21**	0.11–0.41
Ever wanted to quit basic training while in MRP		
No	1.00	
Yes	2.95**	1.55–5.64
Positive Marine Corps career intentions		
Low	1.00	
High	0.14**	0.07–0.28
Expects to graduate from basic training		
No	1.00	
Yes	0.08**	0.03–0.21

Note: Variable categories showing OR = 1.00 are reference categories. OR, odds ratio; CI, confidence interval. * $p < 0.05$; ** $p < 0.01$. ^aNonsignificant.

TABLE III. Final Multivariate Logistic Regression Model to Predict Attrition

Variable	OR	95% CI
Positive Marine Corps career intentions		
Low	1.00	
High	0.27**	0.13–0.59
Expects to graduate from basic training		
No	1.00	
Yes	0.16**	0.06–0.43

OR, odds ratio; CI, confidence interval. ** $p < .01$.

to determine whether they graduated from basic training or were discharged from the Marines. Many of the psychosocial predictors that we hypothesized would predict basic training attrition among injured recruits were, in fact, significant in the univariate analysis. As expected, low organizational commitment was associated with basic training attrition, as was low self-efficacy, and the training day on which the injury occurred. Not surprisingly, high psychological distress was positively associated with attrition. As hypothesized, some of the motivation for enlistment measures were also associated with basic training attrition. Enlisting to develop self-discipline was linked with a lower rate of attrition, whereas enlisting because the individual did not know what else to do at the time was linked with higher attrition. However, the two variables that were the most strongly linked with basic training attrition, and the only two that were retained in the final model, were expecting to graduate from basic training and positive Marine Corps career intentions. As might be expected, both of these variables were protective against attrition.

Recruits who believed they would graduate were over six times more likely to graduate from basic training than those who lacked this belief. This result is consistent with a study by Vickers et al. which found that injured Navy recruits who scored high on expectations about graduation were about seven times more likely to graduate from basic training than those who scored low.¹³ A number of civilian studies have similarly found that workers who believed that they would recover from injury and return to work were significantly more likely to do so than workers who did not hold this belief.^{6,24,30} This phenomenon may be an example of a self-fulfilling prophecy, in which one's belief or prediction about oneself actually causes that belief to become a reality.

Marine Corps career intentions was the other variable that was significantly related to basic training attrition in the final model. Recruits with strong Marine Corps career intentions were about three and half times more likely to graduate from basic training than recruits who lacked strong intentions. Although we are not aware of any other research linking career intentions with return to work after injury, career intentions in the military have been shown to be related to job satisfaction,³¹ and there is evidence linking job satisfaction with favorable return-to-work outcomes.^{32,33} It makes sense that individuals with strong intentions to stay in the Marines remain determined and motivated in the face of obstacles and

have a greater likelihood of completing basic training. It is also possible that recruits with strong career intentions initially enlisted with a more positive attitude toward the Marine Corps, whereas those with weak career intentions may have enlisted primarily because they lacked other attractive job or educational opportunities.

Past research and this study clearly suggest that some construct related to self-expectations plays a key role in recovery and return to work after injury. This construct of beliefs regarding goal attainment may be particularly important in military populations, as evidenced by the very large effect sizes found in the present study and the previous Navy study.¹³ Further research is needed to refine this construct of self-expectations and to improve its measurement. Because basic training is very different from later phases of military life, future research will also be needed to more fully understand the factors that affect injury recovery and return to duty in postbasic training populations and settings.

The results of this study have a number of implications for interventions to prevent attrition among injured recruits. Because we found that expectations were such an important factor in predicting attrition, any changes that would improve recruits' optimism about completing basic training would likely reduce attrition. These could include motivational talks or pep talks to heighten recruits' morale and their desire to graduate, as well as talks aimed at helping recruits to see beyond basic training to future opportunities and experiences in the fleet.

Because it was evident that many MRP recruits felt stalled in their careers at the time they were interviewed for this study, it might be helpful to add activities to the MRP schedule that would allow recruits to continue to make progress toward their career goals despite their injuries. These activities might include studying for military exams that will be required later and physical training that would allow recruits to strengthen uninjured parts of their bodies.

Another type of intervention that might improve motivation and reduce attrition would be a "buddy-aid" or mentoring system in which recruits who were injured at an early phase of training are mentored by recruits who are in a more advanced phase of training and who have a high level of motivation and commitment. Attending at least one basic training graduation ceremony might also make graduation seem more within reach.

A number of limitations of the present study should be noted. First, a large number of variables were considered as predictors of basic training attrition, making it possible that some of the significant findings could have been the result of chance. Second, all risk factor data were collected "after" the event of interest (the injury), making it impossible to determine cause and effect. Third, because data collection for this study occurred between November and May only, the participants in the sample may not be completely representative of the general MRP recruit population. An additional limitation of the study is the fact that many of the items on the questionnaire

were developed solely for the purpose of this study, and were not previously validated measures. A final limitation was our reliance on self-report data, which are subject to social desirability effects and other forms of response bias.

In conclusion, this study found that psychosocial factors, such as expectations about completion of basic training, had a powerful impact on attrition. This study extended past research by examining a variety of theoretically important predictors of basic training attrition in a sample of military recruits with

musculoskeletal injuries. The results of this research suggest that interventions to reduce attrition in injured military populations should emphasize cognitive and psychosocial variables that can impact return to duty and attrition.

ACKNOWLEDGMENTS

We gratefully acknowledge Mr. James Reading, CAPT Gregg Ziemke, and Ms. Kimberly Flinn for assistance with this study.

APPENDIX I

PREDICTOR VARIABLES INCLUDED IN THE STUDY

Descriptives

Age (Q)
Race/ethnicity (Q)
Education (Q)
Marital status (Q)
Time in Delayed Entry Program (Q)
Training day injured (I)

Medical or Health-Related Variables

Diagnosis of a stress fracture (I)
More than one injury (I)
Cigarette use (Q)
Exercise frequency before entering the Marines (Q)
Body mass index (Q)

Psychosocial Variables

Psychological distress (Q)
Organizational commitment (Q)
Self-efficacy (Q)
Enlisted for the travel and adventure (Q)
Enlisted for the educational benefits (Q)
Enlisted because he did not know what else to do at the time (Q)
Enlisted to develop self-discipline (Q)
Enlisted to serve country (Q)
Certainty about decision to join (Q)
Positive expectations about returning to training (Q)
Self-rated severity of injury (I)
Current pain rating (I)
Perceived limitations due to injury (Q)

APPENDIX I (CONTINUED)

Peer bonding (Q)
Attitude toward basic training (Q)
Morale while in MRP (I)
Other recruits in MRP have hurt his motivation (I)
Positive attitude toward MRP Drill Instructors (I)
Self-rated level of determination to complete basic training (I)
Ever wanted to quit basic training while in MRP (I)
Positive Marine Corps career intentions (Q)
Expects to graduate from basic training (I)

I, interview; Q, questionnaire

APPENDIX II

DESCRIPTION OF VARIABLES AND MEASURES USED IN THE STUDY

Variable	Source and Description
	Questionnaire
<i>Age</i>	
	"How old are you?" (Fill in the blank.)
<i>Race</i>	
	"What is your ethnic background?" (1) White (not Hispanic/Latino); (2) Hispanic/Latino; (3) Black/African-American; (4) American Indian or Alaska Native; (5) Asian/Pacific Islander; (6) Other. White: (1); Hispanic: (2); Other: responses (3), (4), (5), or (6).
<i>Education</i>	
	"How much education have you completed?" (1) GED only; (2) Finished high school; (3) Finished high school and some college; (4) Associate's degree; (5) Bachelor's degree or higher. GED only: (1); High school diploma only: (2); Some college/college degree: responses (3), (4), or (5).
<i>Marital status</i>	
	"What is your marital status?" (1) Single/Never Married; (2) Married; (3) Divorced; (4) Widowed. Single/never married: response (1); Married/divorced/widowed: responses (3) or (4).

APPENDIX II (CONTINUED)

Variable	Source and Description
	Questionnaire
<i>Time in Delayed Entry Program</i>	<p>“Were you in the Delayed Entry Program?” (1) Yes; (2) No. “If Yes, for how long?” (Fill in the blank.) Coded as 0–1 month, 2–5 months, >5 months.</p>
<i>Cigarette use</i>	<p>“How often did you smoke cigarettes in the year before joining the military?” (1) Not at all; (2) Some days; (3) Most days or every day. Nonsmoker: Not at all. Smoker: Some days, most days, or every day.</p>
<i>Exercise frequency before entering the Marines</i>	<p>“In the year before entering the Marines, in the average week, how many times did you engage in strenuous physical activity for at least 20 minutes?” (1) 0 times a week; (2) 1–2 times a week; (3) 3–4 times a week; (4) 5–6 times a week; (5) 7 or more times a week. Low: response (1) or (2); High: response (3), (4), or (5).</p>
<i>Body mass index</i>	<p>“About how tall are you without shoes on?” (height). “About how much do you weigh without shoes on?” (weight). Formula used to compute body mass index (BMI) = weight (lb)/[height (in)]² × 703. Normal or underweight: BMI ≤ 24.9. Exceeds normal: BMI > 25.</p>
<i>Psychological distress (scale)</i>	<p>12-item General Health Questionnaire (GHQ-12). “Have you recently:” (1) Been able to concentrate on whatever you’re doing?; (2) Lost much sleep over worry?; (3) Felt that you are playing a useful part in things?; (4) Felt capable of making decisions about things?; (5) Felt constantly under strain?; (6) Felt that you couldn’t overcome your difficulties?; (7) Been able to enjoy your normal day-to-day activities?; (8) Been able to face up to your problems?; (9) Been feeling unhappy and depressed?; (10) Been losing confidence in yourself?; (11) Been doubting your personal worth?; (12) Been feeling reasonably happy, all things considered? Response options: (1) not at all, (2) no more than usual, (3) rather more than usual, (4) much more than usual.</p>

APPENDIX II (CONTINUED)

Variable	Source and Description
	Questionnaire

Organizational commitment (scale)

9-item scale. (1) I feel like “part of the family” in the Marine Corps; (2) The Marine Corps has a great deal of personal meaning for me; (3) I (scale) feel a strong sense of belonging to the Marine Corps; (4) I feel emotionally attached to the Marine Corps; (5) If I left the Marine Corps, it would be a huge step backward for me; (6) I believe the Marine Corps takes good care of its people; (7) What the Marine Corps stands for is important to me; (8) I will always think of myself as a Marine; (9) I am proud of the history and traditions of the Marine Corps. Response options: (1) strongly disagree (2) disagree (3) neutral, (4) agree, (5) strongly agree.

Self-efficacy (scale)

10-item scale. (1) I can always manage to solve problems if I try hard enough; (2) If someone opposes me, I can find the means and ways to get what I want; (3) It is easy for me to stick to my aims and accomplish my goals; (4) I am confident that I could deal efficiently with unexpected events; (5) Thanks to my resourcefulness, I know how to handle unforeseen situations; (6) I can solve most problems if I invest the necessary effort; (7) I can remain calm when facing difficulties because I can rely on my coping abilities; (8) When I am confronted with a problem, I can usually find several solutions; (9) If I am in trouble, I can usually think of a solution; (10) I can usually handle whatever comes my way. Response options: (1) not at all true, (2) hardly true, (3) moderately true, (4) exactly true.

Reasons for enlisting

(1) I joined the Marines for the travel and adventure; (2) I joined the Marines for the educational (college) benefits; (3) I joined the Marines because I did not know what else to do at the time; (4) I joined the Marines to develop self-discipline; (5) I joined the Marines to serve my country. Response options: (1) strongly disagree (2) disagree (3) neutral, (4) agree, (5) strongly agree. Yes: agree or strongly agree. No: neutral, disagree, or strongly disagree.

Certainty about decision to join

When I joined the Marines, I was very sure it was the right choice for me. Response options: (1) strongly disagree (2) disagree (3) neutral, (4) agree, (5) strongly agree. Yes: agree or strongly agree. No: neutral, disagree, or strongly disagree.

APPENDIX II (CONTINUED)

Variable	Source and Description
	Questionnaire

Positive expectations about returning to training (scale)

3-item scale: (1) I strongly believe that I will complete basic training; (2) I strongly believe that I will recover quickly from my injury; (3) How confident are you that you will return to basic training? Response options for items 1 and 2: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, (5) strongly agree. Response options for item 3: (1) not at all confident, (2) somewhat confident, (3) confident, (4) very confident, (5) extremely confident.

Perceived limitations due to injury (scale)

2-item scale: (1) To what degree has your injury limited your ability to carry out normal day-to-day activities (walking, climbing stairs, getting dressed, etc.)?; (2) To what degree has your injury limited your ability to carry out your military duties? Response options: (1) not at all, (2) slightly, (3) somewhat, (4) moderately, (5) extremely.

Peer bonding (scale)

4-item scale. (1) I have not made any close friends since I joined the Marines; (2) I feel like I don't fit in with other recruits; (3) I feel like other recruits don't respect me; (4) I feel like I have friends in the Marine Corps. Response options: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, (5) strongly agree.

Attitude toward basic training (scale)

4-item scale. With regard to Basic training, please rate the following: (1) Morale in your platoon; (2) Cohesion in your platoon; (3) Level of confidence in your drill instructors; (4) Level of your drill instructors' concern for recruits. Response options: (1) very low, (2) low, (3) medium, (4) high, (5) very high.

Positive Marine Corps career intentions (scale)

2-item scale. (1) If you could stay on active duty as long as you want, how likely is it that you would serve in the Marines for at least 20 years?; (2) How likely is it that you will complete your enlistment term? Response options: (1) very unlikely, (2) unlikely, (3) neither likely nor unlikely, (4) likely, (5) very likely.

APPENDIX II (CONTINUED)

Variable	Source and Description
	Questionnaire
	Interview

Diagnosis of a stress fracture

Have you been told that you have a stress fracture? (yes/no)

More than one injury

How many injuries do you have? Coded as 1 or >1.

Training day

On what training day (T-day) did your injury occur? Coded as 0–30 days or >30 days.

Self-rated severity of injury

When you were first injured, how severe would you say your injury was? Response scale ranged from (0) not at all to (10) extremely severe. Low: <6. High: ≥6.

Current pain rating

On average, what is your current pain level on a scale of zero to ten? Response scale ranged from (0) no pain to (10) worst possible pain. Low: <3. High: ≥3.

Morale while in MRP

On average, how high or low has your level of motivation or morale MRP been since you've been in the MRP? Response options: (1) low, (2) fairly low, (3) medium, (4) fairly high, (5) high. Low: low, fairly low, or medium. High: fairly high or high.

Other recruits in MRP have hurt his motivation

Are other recruits here in the MRP with bad attitudes hurting your motivation? Response options: (1) yes, (2) maybe/unsure, (3) no. Low: no. High: yes or maybe/unsure.

Positive attitude toward MRP drill instructors

APPENDIX II (CONTINUED)

Variable	Source and Description
	Questionnaire
<p>Overall, have your experiences with the drill instructors at MRP been more positive, more negative, or neutral? Response options: (1) positive, (2) neutral, (3) negative. Low: neutral or negative. High: positive.</p> <p><i>Self-rated level of determination to complete basic training</i></p> <p>How determined are you to complete basic training now? Response options: (1) not at all determined, (2) somewhat determined, (3) determined, (4) very determined, and (5) extremely determined. Low: not at all determined, somewhat determined, or determined. High: very determined or extremely determined.</p> <p><i>Ever wanted to quit basic training</i></p> <p>Was there ever a time while you have been at the MRP that you were so quit basic training discouraged that you wanted to quit basic training? (yes/no)</p> <p><i>Expects to graduate from basic training</i></p> <p>Do you expect to graduate from basic training? Response options: (1) does not expect to graduate, (2) not sure, (3) expects to graduate. Yes: expects to graduate. No: does not expect to graduate or not sure.</p> <p><i>Notes:</i> Each of the scales used in the study (psychological distress, organizational commitment, self-efficacy, positive expectations about returning to duty, perceived limitations due to injury, peer bonding, attitude toward basic training, and positive Marine Corps career intentions) was dichotomized at the median of the response distribution.</p>	

REFERENCES

- Kaufman KR, Brodine S, Shaffer R: Military training-related injuries: surveillance, research, and prevention. *Am J Prev Med* 2000; 18: 54–63.
- Army Medical Surveillance Activity: Estimates of absolute and relative morbidity burdens attributable to various illnesses and injuries, US Armed Forces, 2003. *MSMR* 2004; 10(3): 15–20.
- Hauret KG, Knapik JJ, Lange JL, Heckel HA, Coval DL, Duplessis DH: Outcomes of Fort Jackson's Physical Training and Rehabilitation Program in Army basic combat training: return to training, graduation, and 2-year retention. *Milit Med* 2004; 169: 562–7.
- Petrie KJ, Weinman J, Sharpe N, Buckley J: Role of patients' view of their illness in predicting return to work and functioning after myocardial infarction: longitudinal study. *BMJ* 1996; 312: 1191–4.
- Quinn AM, Fallon BJ: Predictors of recovery time. *J Sport Rehabil* 2000; 9: 62–76.
- Schultz IZ, Crook J, Berkowitz J, Milner R, Meloche GR: Predicting return to work after low back injury using the Psychosocial Risk for Occupational Disability Instrument: a validation study. *J Occup Rehabil* 2005; 15: 365–76.
- Van der Giezen AM, Bouter LM, Nijhuis FJ: Prediction of return-to-work of low back pain patients sicklisted for 3–4 months. *Pain* 2000; 87: 285–94.
- Jones BH, Amoroso PJ, Canham ML, Weyandt MB, Schmitt JB: Atlas of injuries in the U.S. Armed Forces: a report by the DoD Injury Surveillance and Prevention Working Group for the Assistant Deputy Under Secretary of Defense for Safety and Occupational Health. Technical Report 92-99. Aberdeen Proving Ground, MD, United States Army Center for Health Promotion and Preventive Medicine, 1999.
- Jones B, Manikowski R, Harris J, Dziados J, Norton S: Incidence and risk factors for injury and illness among male and female Army basic trainees. Technical Report T19-88. Natick, MA, Army Research Institute of Environmental Medicine, 1988.

10. Dawson DA, Adams PF: Current estimates from the National Health Interview Survey, United States. Vital and Health Statistics (Series 10, No. 164, DHHD Pub. no. 87-1592). Washington, DC, National Center for Health Statistics, 1987.
11. Hervig LK, Vickers RR Jr, Bischoff C: Medical Rehabilitation Program: II. Effects on basic training graduation rate. Technical Report 91-29. San Diego, CA, Naval Health Research Center, 1991.
12. Farkas AJ: Selective retention: a longitudinal analysis. III. A comparison of recruit training attrites, delayed graduates, and graduates. Technical Report 81-3. San Diego, CA, Navy Personnel Research and Development Center, 1980.
13. Vickers RR Jr, Gordon TM, Donaldson S, Bischoff CW, Hervig LK: Medical Rehabilitation Program: III. Psychological factors related to program effectiveness. NHRC Technical Report 91-30. San Diego, CA, Naval Health Research Center, 1992.
14. Mathieu JE, Zajac DM: A review and meta-analysis of the antecedents, correlates, and consequences of organizational commitment. Psychol Bull 1990; 108: 171-94.
15. Allen NJ: Organizational commitment in the military: a discussion of research and practice. Mil Psychol 2003; 15: 237-53.
16. Lanier DC, Stockton P: Clinical predictors of outcome of acute episodes of low back pain. J Fam Pract 1988; 27: 483-9.
17. Mossey JM, Knott K, Craik R: The effects of persistent depressive symptoms on fracture recovery. J Gerontol 1990; 45: M163-8.
18. Vickers RR Jr, Hervig LK, Bischoff CW: Stress reactivity: prediction of attrition following medical problems in basic training. Technical Report 91-48. San Diego, CA, Naval Health Research Center, 1995.
19. Larson GE, Booth-Kewley S, Ryan MA: Predictors of Navy attrition II: a demonstration of potential usefulness for screening. Milit Med 2002; 167: 770-6.
20. Bandura A: Social Foundations of Thought and Action: A Social Cognitive Theory. Englewood Cliffs, NJ, Prentice Hall, 1986.
21. Bandura A: Self-Efficacy: The Exercise of Control. New York, WH Freeman and Company, 1997.
22. Dionne CE, Bourbonnais R, Fremont P, et al: Determinants of "return to work in good health" among workers with back pain who consult in primary care settings: a 2-year prospective study. Eur Spine J 2007; 16: 641-55.
23. Waldrop D, Lightsey R, Ethington CA, Woemmel CA, Coke AL: Self-efficacy, optimism, health competence, and recovery from orthopedic surgery. J Couns Psychol 2001; 48: 233-8.
24. Kapoor S, Shaw WS, Pransky G, Patterson W: Initial patient and clinician expectations of return to work after acute onset of work-related low back pain. J Occup Environ Med 2006; 48: 1173-80.
25. Sandstrom J, Esbjornsson E: Return to work after rehabilitation. Scand J Rehabil Med 1986; 18: 29-33.
26. Jerusalem M, Schwarzer R: Self-Efficacy: Thought Control of Action. Washington, DC, Hemisphere Publishing Corp., 1992.
27. Goldberg D: The Detection of Psychiatric Illness by Questionnaire. Maudsley Monograph No. 21. London, England, Oxford University Press, 1972.
28. Meyer JP, Allen NJ: Commitment in the Workplace: Theory, Research, and Application. Thousand Oaks, CA, Sage, 1997.
29. Gade PA, Tiggel RB, Schumm WR: The measurement and consequences of military organizational commitment in soldiers and spouses. Mil Psychol 2003; 15: 191-207.
30. Hansen A, Edlund C, Henningsson M: Factors relevant to a return to work: a multivariate approach. Work 2006; 26: 179-90.
31. Lakhani H, Gade P: Career decisions of dual military career couples: a multidisciplinary analysis of the U.S. Army. J Econ Psychol 1992; 13: 153-66.
32. Heymans MW, De Vet HC, Knol DL, Bongers PM, Koes BW, Van Mechelen W: Workers' beliefs and expectations affect return to work over 12 months. J Occup Rehabil 2006; 16: 685-95.
33. Hansson T, Jensen I: Sickness absence due to back and neck disorders. Scand J Public Health 2004; 32: 109-51.

REPORT DOCUMENTATION PAGE

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB Control number. **PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.**

1. Report Date (DD MM YY)
21 Nov 2007

2. Report Type
Final

3. DATES COVERED (from - to)
November 2005 - May 2006

4. TITLE AND SUBTITLE

Psychosocial Predictors of Return to Duty Among Marine Recruits With Musculoskeletal Injuries

6. AUTHORS

Booth-Kewley, Stephanie; Larson, Gerald E., Highfill-McRoy, Robin

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Commanding Officer
Naval Health Research Center
140 Sylvester Rd
San Diego, CA 92108

8. SPONSORING/MONITORING AGENCY NAMES(S) AND ADDRESS(ES)

Commanding Officer	Commander
Naval Medical Research Center	Navy Medicine Support Command
503 Robert Grant Ave	P.O. Box 140
Silver Spring, MD 20910-7500	Jacksonville, FL 32213-0140

5a. Contract Number:

5b. Grant Number:

5c. Program Element:

5d. Project Number:

5e. Task Number:

5f. Work Unit Number: 60533

8. PERFORMING ORGANIZATION REPORT NUMBER

Report No. 08-01

10. Sponsor/Monitor's Acronyms(s)

NMRC/NMSC

11. Sponsor/Monitor's Report Number(s)

12 DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT (maximum 200 words)

Psychosocial factors may have an important impact on injury recovery and return to work. To explore the influence of psychosocial factors in a cohort of injured military personnel, data were collected from 166 Marine Corps basic training recruits with musculoskeletal injuries. This sample was followed prospectively to determine whether they graduated from basic training or were discharged from the Marines. Demographic, injury-related, and psychosocial factors were analyzed to determine predictors of failure to graduate from basic training. The strongest risk factors for failing to graduate were not expecting to graduate, low or uncertain career intentions, lack of determination, psychological distress, and low organizational commitment. In the final multivariate logistics model, two predictors of failure to graduate emerged: not expecting to graduate and low or uncertain career intentions. The results of this research suggest that interventions to reduce attrition in injured military populations should emphasize cognitive and psychosocial variables that can impact return to duty and attrition.

14. SUBJECT TERMS

musculoskeletal injury, attrition, return to duty, basic training, psychosocial factors

16. SECURITY CLASSIFICATION OF:

a. REPORT
UNCL

b. ABSTRACT
UNCL

b. THIS PAGE
UNCL

17. LIMITATION OF ABSTRACT
UNCL

18. NUMBER OF PAGES
14

18a. NAME OF RESPONSIBLE PERSON
Commanding Officer

18b. TELEPHONE NUMBER (INCLUDING AREA CODE)
COMM/DSN: (619) 553-8429